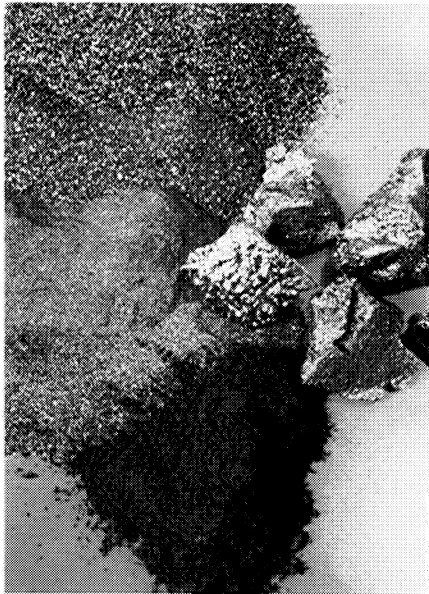

Ceramic Powders

Advanced Refractory Technologies, Inc. (ART), Buffalo, New York is a new company, founded in 1981, that produces specialty ceramic powders and related products for government and industrial customers, including companies in the oil, automotive, electronics and nuclear industries. Fine ceramic powders are ingredients in a new generation of materials that help improve industrial production efficiency, lower energy usage and reduce demand for scarce raw materials. Their properties are particularly applicable to materials that will be exposed to extreme heat, materials that must be corrosion or wear resistant, and materials used as electricity insulators.

In developing its product line, ART sought technical assistance from the New England Research Application Center (NERAC); located at the University of Connecticut, Storrs, NERAC is one of 10 NASA



sponsored dissemination centers that provide information and technical help to industrial and government clients. ART requested information in specific areas of ceramic materials and silicon technology and also asked for assistance in identifying possible applications of these materials in government programs and in the automotive and electronics industries.

NERAC conducted a computerized search of several data bases and provided extensive information in the subject areas requested. ART vice president Dr. Peter T. B. Shaffer followed up the NERAC search by contacting officials of NASA and other organizations to get more detailed information on NERAC-provided reports of special interest to the company. NERAC's assistance resulted in transfer of technologies that helped the ART staff develop a unique method for manufacture of ceramic materials to precise customer specifications.

ART now produces all grades of material and specializes in high purity, extremely fine powders. The left photo shows a sampling of particle sizes, ranging from three-quarter-inch chunks to submicron powders.

The firm has filled a void in the marketplace for

ultrafine boron carbide, used as an abrasive in lapping, grinding and ultrasonic machinery; as a neutron absorber for shielding applications in the nuclear industry; and for application on ceramics and other hard materials for surface finishing and polishing. ART either sells boron carbide in powder form or uses it internally to make parts for the nuclear industry. The photo above shows a variety of parts fabricated by ART for use in demanding nuclear reactor core applications.

Among other company products are silicon carbide, an excellent abrasive on most hard materials that need finishing and a candidate for many structural applications; chrome oxide, a coating for guard against wear; zirconium oxide for protection against heat; and titanium diboride, used in electrodes in production of primary aluminum. This latter material was until recently considered too costly for the aluminum application, but ART developed a titanium diboride powder which, fabricated into solid components, may extend the useful life of electrodes from three to 300 days, offering increased production and decreased energy consumption at lower cost.